

# Water and process solutions for the chemical industry





## Maximizing Uptime And Sustainability

Today, chemical producers face a variety of challenges, and as is the case in many industries, the chemical industry also is a study in contrasts. Growing regions—including the Middle East, China, Southeast Asia, and Latin America—are seeing a surge in the development and building of new chemical operations, while more mature economies, such as North America and Europe, are seeing slower growth and demand for chemical plants.

Many of these regions are also facing water shortages and water quality issues. In Western Europe, where the cost of feedstock is high, unpredictable, and rising, fuel prices for ethylene and styrene producers are the major concern. While current trends may differ from one location to another, chemical plant managers throughout the world have similar goals and desire similar solutions, including:

- Increased or stabilized production rates
- Reduction in overall operating expenses
- Increased or stabilized yield of desired products
- Asset protection
- Decreased yield of undesired products
- Increased time between shutdowns
- Solutions that are safe and harmless to the environment

Veolia is well positioned to understand and tackle current and future concerns with sound water and process treatment solutions that not only help chemical plants solve their toughest-to-treat applications, but also run safer, more efficient, and more profitable operations.

For more than 120 years, Veolia has maintained its commitment to providing sustainable solutions that help customers around the globe address their most pressing challenges. Today, concerns about water availability and quality further threaten the significant role this most valuable resource plays in the chemical industry. As water scarcity, chemical demand, and environmental regulations increase, Veolia continues to invest in research and innovative technologies for water and process treatment that allow our customers to optimize their operations, while reducing energy and water consumption and complying with regulatory mandates.

### Veolia's Industry Application Experience

- Acrylic acid
- Ammonia
- Cumene
- Isoprene
- Acrylonitrile
- Aromatics
- Ethylene/propylene
- Methanol
- Air separation
- Butadiene
- EDC/VCM
- Styrene



## Chemical Processing Technology And Solutions

Transforming lower-value feedstock into high-value chemical products requires the careful coordination and precision of many complex and expensive systems. We know that your profitability depends on maintaining the quality and efficiency of these key process units, controlling operating costs, meeting environmental requirements and improving efficiencies in every step of the production process, while also ensuring final product quality. Veolia offers a complete portfolio of chemical and equipment solutions to reduce corrosion and fouling, decrease polymerization, save energy, reuse water, and extend plant run length. Our technology offers the following solutions:



### Process Chemicals

- Antifoulants (polymerization inhibitors and dispersants) control fouling and can achieve an extended, more efficient operation of critical equipment to enhance high-quality products.
- Corrosion inhibitors (neutralizers and filmers) can prevent corrosion in critical production units to extend equipment life, maintain throughput, and increase operational flexibility.
- Antifoams can prevent and control foaming to improve operational reliability and throughput.
- Demulsifiers enhance the phase separation between hydrocarbons and water to improve equipment performance, efficiency, and throughput.
- Oxygen scavengers reduce system corrosion and peroxide formation to reduce fouling potential and improve reliability.
- Integrated ethylene compressor efficiency solutions include compressors and turbines, antifouling chemical treatments, real-time remote monitoring and diagnostics, and technical assistance from Veolia's compressor and process experts.



### Water Chemicals And Equipment

- Complete suite of on-line and off-line monitoring solutions and knowledge management systems to enhance performance and protect assets, including Veolia's newest TrueSense\* platform.
- Utilities solutions that include boiler, cooling, and advanced chemicals help to improve plant productivity and water systems, while safeguarding assets and helping to ensure environmental protection.
- Integrated wastewater management and water reuse solutions promote water recovery, treatment, and recycling.
- Veolia's mobile water fleet (the largest in the world) meets the demand for onsite water treatment through emergency, short-term leases, and long-term water outsourcing (BOO).
- Clarification and filtration technologies offer raw water pretreatment for process applications, as well as a range of wastewater treatment applications, including oil and solids removal, foam control, bioaugmentation, and sludge dewatering.
- Veolia's complete portfolio of membrane clarification and water purification technologies provides influent treatment of a diverse variety of non-potable water sources, including brackish and seawater.





## Taking the guesswork out of chemical production

Chemical and petrochemical processing presents significant operating and business challenges in today's environment. Veolia provides superior technologies and services to the chemical and petrochemical industries that can reduce overall operating and product costs, while enhancing plant performance and reliability. As a leading provider of water and process treatment solutions to the global chemical industry, we have the experience to offer you individualized treatment programs that can help you:

- Improve chemical plant throughput
- Protect valuable capital assets
- Increase profit and yield
- Increase run length
- Comply with environmental health and safety regulations

Veolia's customer-focused business practices ensure that you will have dedicated chemical processing specialists who will work with you to meet your economic, quality, safety, and environmental performance objectives. Through our unrivaled combination of innovation, technical and onsite support, and field engineering, we can work with you to get the most from every step in your chemical production process.



## Case Study

### Veolia saves energy costs and increases polytropic efficiency for Malaysian olefin plant

A Malaysian ethylene plant was experiencing extreme fouling in stage three of the process gas compressor. The operations manager asked Veolia to determine whether the plant was losing energy due to fouling, and if chemical treatment was a viable solution to the decrease in energy efficiency and polytropic efficiency (PE) the plant was experiencing. Based on an analysis of all compression stages, engineers from Veolia recommended chemical treatment in stages three and four. The data showed that the energy loss and fouling were substantial enough to warrant treatment. The PE trend for both stages three and four was declining before treatment. After treatment, the PE trend for both stages began recovering. During the next plant turnaround, there was considerably less fouling in stages three and four.

## Case Study

### Veolia helps Thai olefin plant prevent fouling in debutanizer

A petrochemical plant in Thailand was experiencing severe fouling from the debutanizer feed tray to the upper trays. The plant also experienced moderate fouling at the bottom of the debutanizer and low pressure depropanizer, and low fouling at the high pressure depropanizer. The fouling at the debutanizer caused an unscheduled plant shutdown. Veolia was contacted to analyze and solve this extreme fouling problem, and after careful analysis, recommended feeding Petroflo\*. Since start-up, all columns and reboilers have been

running with less fouling and an obvious improvement at the debutanizer. Additionally, the customer estimated that the Veolia treatment solution cost approximately 50 percent less than the previous treatment program.

## Case Study

### Ferroquest\* helps ammonia producer save 114 million ft<sup>3</sup> of natural gas

The Ammonia I unit at one of the largest fertilizer complexes in North America was experiencing low production efficiency due to suspected calcium carbonate scale in the cooling system, resulting in poor heat transfer in the cooling exchangers. The efficiency of the cooling system is critical in anhydrous ammonia production because the process involves heating gases to 1400°F (760°C) and then cooling the product down to -27°F (-33°C). Scale build-up in the cooling exchangers dramatically increases the cost of production.

After evaluating the possibility of localized chemical cleaning of specific exchanger components, Veolia recommended the application of Ferroquest to the entire cooling circuit. Ferroquest is a Veolia proprietary organic acid, developed specifically to remove calcium carbonate scale from cooling systems. In the following production run, the plant increased unit production and reduced natural gas consumption by 114 million ft<sup>3</sup> of natural gas due to increased efficiency of the cooling system. This was equivalent to a reduction of the energy coefficient by 1.3 gigajoules per metric ton of ammonia produced.





## Case Study

### Chemical manufacturer avoided production loss using mobile treatment system for repairs

A large U.S. Gulf Coast chemical manufacturer obtains water from a local river to support utilities and process needs, such as cooling, steam generation, and process water. The river water requires clarification—the removal of suspended and colloidal matter—as the first and most critical treatment step. An unexpected failure of the sludge rake drive system occurred, requiring emergency repairs.

The maintenance project required that the clarifier system be shut down, resulting in lost plant production. Veolia supplied a temporary trailer-mounted filter system to operate during the repair outage so that production of clarified water could be maintained. The system was comprised of eight of Veolia's MobileFlow\* trailer-enclosed filter units, each containing six pressure vessels loaded with dual media. A coagulant chemical was added to the system influent, filtration occurred in down-flow mode, and periodic backwash was performed to remove suspended solids. The repair work took ten days, during which time the temporary filter system produced more than 40 million gallons (151,000 m<sup>3</sup>) of clarified water to meet the plant's production requirements and contractual commitments to the neighboring plant. Veolia's mobile treatment system helped the customer avoid ten days of production loss and save millions of dollars by carrying out the repairs without a plant shutdown.

## Case Study

### Fouling prevention for styrene plant vent gas compressor

A Western European styrene producer was experiencing vent gas compressor fouling, and water was being injected into the compressor to reduce the discharge temperature. Ethylbenzene also was used as wash oil for the compressor. The fouling rate depended on both throughput and temperature—high during the summer period—and was resulting in two production outages for compressor cleaning per year. Veolia proposed a Styrex\* treatment to minimize the compressor fouling. The chemical was dosed into the ethylbenzene wash oil at a dose rate dependent upon operating conditions. Treatment monitoring was done by MRA/SPC evaluation of the delta-P. The treatment target was set at a run length of 18 months, which has been achieved. The delta-P increase was very small, and at the turnaround, the compressor was visibly clean.



## Investing In Technology Development

Veolia is synonymous with technology and innovation. As a leader in water and process technologies, our business is committed to helping our customers address the major water challenges they face today and stay ahead of the challenges of tomorrow. To that end, Veolia employs more than 36,000 researchers tasked with driving innovation at our global research centers. We partner with industry leaders, as well as research and educational institutions around the world, to find the best ways to develop innovative technologies and chemical plant and process solutions.

## Partnering With Veolia

For decades, Veolia has been a strategic partner to chemical production companies around the world, delivering complete water and process tools and technologies that help to meet the industry's greatest operational challenges. Today, we are just as committed to developing proven solutions that will help you meet your business objectives now and in the future—cost-effectively, efficiently, and responsibly. From growing environmental regulations to future trends, our experience and ability to anticipate industry changes gives us the ability to meet the unique needs of chemical and petrochemical plants with customized treatment programs that can help you stay on top.



# Resourcing the world

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